

## **MAGNETIC ASSEMBLY TOY**

### **Cross-Reference to Related Applications**

[0001] This application claims the benefit of and priority under 35 U.S.C. 119(e) to U.S. Provisional Application No. 60/419,205 entitled "Magnetic Assembly Toy Car,"  
5 filed October 16, 2002, the disclosure of which is incorporated herein by reference.

### **Background**

[0002] The present disclosure relates generally to magnetically assembled toys, and more particularly to magnetic assembly toy vehicles to which accessories may be attached. Various toys with magnets are disclosed in U.S. Patent Nos. 2,767,517,  
10 4,038,775, 4,118,888, 4,170,840, 4,176,492, 4,183,173, 4,186,515, 4,206,564, 5,277,643, 5,295,889, 5,380,233, 5,727,717, 6,171,169, 6,431,936 and 6,592,427 the disclosures of which are incorporated herein by reference.

### **Summary**

[0003] The present disclosure is directed to toys, having a plurality of components  
15 that are adapted to couple magnetically with one another. The toy includes at least one magnetic portion that is affixed to one of the plurality of components. In some embodiments, at least one of the plurality of components may be adapted to rotate. The toy may take the form of a vehicle, in which case the components may represent portions of a vehicle such as a vehicle body.

### Brief Description of the Drawings

[0004] Fig. 1 is a top isometric view of a toy according to the present disclosure, including components having magnetic portions.

[0005] Fig. 2 is a schematic diagram illustrating assembly of a first component to one or more of a second component and a third component of the toy of Fig. 1, with at least two components of the toy coupled by magnets.

[0006] Fig. 3 is a top isometric view of a portion of an exemplary toy vehicle including a cockpit, a chassis, and an axle with wheels.

[0007] Fig. 4 shows a bottom isometric view of an alternative embodiment of the cockpit depicted in Fig. 3.

[0008] Fig. 5 shows a bottom isometric view of the body depicted in Fig. 1.

[0009] Fig. 6 shows a bottom isometric view of the cockpit depicted in Fig. 4, assembled with the body depicted in Fig. 5.

[0010] Fig. 7 shows a bottom isometric view of the assembly depicted in Fig. 6, assembled with the axel with wheels depicted in Fig. 3.

[0011] Fig. 8 shows a bottom isometric view of the assembly depicted in Fig. 7, assembled with another set of an axel and wheels.

[0012] Fig. 9 shows a bottom isometric view of the assembly depicted in Fig. 8, assembled with the chassis depicted in Fig. 3, and assembled with various accessories.

[0013] Fig. 10 shows a bottom isometric view of the assembly depicted in Fig. 9, with some of the accessories shown adjacent to the assembly, as duplicate components,  
5 for clarity.

[0014] Fig. 11 is a top isometric view of a rear portion of the toy vehicle shown in Fig. 1, with a spoiler shown in proximity to the body of the toy vehicle.

#### Detailed Description and Best Mode of the Disclosure

[0015] An illustrative example of a toy is shown in Fig. 1 and indicated generally at  
10 10. Toy 10 may take the form of a vehicle, as shown, or numerous other forms including, but not limited to, trains, motorcycles, aircraft, or watercraft. Alternatively, toy 10 may take the form of action figures, robots, buildings, etc. Toy 10 includes a plurality of components 12 that are configured to be easily disassembled and reassembled by a user for increased enjoyment during play. Thus, a young child may enjoy the thrill of building  
15 his or her toy whenever he or she chooses with limited frustrations as the components themselves assist in this process.

[0016] In the depicted embodiment, a variety of components 12 are selectively coupled with one another to form a complete toy. Select components of toy 10 are held together by magnetic attraction therebetween. This attraction may be accomplished

through strategic location of magnetic portions 14 on one component that interact with either magnetic portions located on other components or with components that are made of a ferrous metal, or combinations thereof.

[0017] When toy 10 is in the form of a vehicle, components 12 may include a vehicle body 16, a cockpit 18, and a chassis 20, as illustrated in Fig. 1. As shown, cockpit 18 fits within body 16 and mates with chassis 20 to simulate the internal structure of a typical toy vehicle. Although cockpit 18 is shown placed within body 16, cockpit 18 may alternatively be integrally formed with vehicle body 16. Thus, the quantity of components may be adjusted to provide toys of varying levels of difficulty.

[0018] Additional components may be included and may provide a more realistic look and feel of toy 10. These components may include axles 22 and wheels 24. The vehicle may further include a variety of components in the form of vehicle accessories 26, as will subsequently be discussed.

[0019] In the exemplary diagram shown in Fig. 2, a first component 28 is retained between a second component 30 and a third component 32, which may be coupled to one another through magnetic attraction as previously described. The terms “first component,” etc. may refer to any of the components 12 as these terms are used for simplicity of description only. For example, the first, second and third components may refer to axle 22, cockpit 18 and chassis 20, respectively.

[0020] At least one of the first, second, and third components includes a magnetic portion 14 that may be disposed on the component or embedded within the component. Alternatively, the component as a whole may be formed from a magnetic material. When disposed on the component, the magnetic portion may be secured to the component through any suitable fastener, such as glue, Velcro®, snaps, clips, and the like.

[0021] Component 12 may be made of plastic such that magnetic portions 14 may be on or embedded within the respective component. Plastic components with integrated magnetic portions may make the toy light weight so that it can be easily handled by a young child.

[0022] Magnetic attraction between components 12 may be used to couple the components together. In some embodiments, one of components 12, such as second component 30, may be made of a ferrous material, or have a ferrous material portion, by which magnetic portion 14 of third component 32 couples these components together, as in the case of cockpit 18 being placed within vehicle body 16, as previously shown in Fig. 1.

[0023] Toy 10 may include a component capable of movement, such as rotation. Referring back to Fig. 1, assembly of a rotatable element 34, such as axle 22 and/or wheels 24, may result in enhanced enjoyment of the child's assembly efforts. A child may engage in play with the vehicle, such as by rolling it across a surface, once such a rotatable element has been assembled. For example, rotatable element 34 may be joined

to one of the other components through magnetic attraction or may be disposed between two or more magnetically coupled components.

[0024] For example, first component 28 may take the form of a rotatable element 34 including one or more axles 22 that support one or more wheels 24, as shown in Fig. 1.

5 In some embodiments, first component 28 includes a ferrous material to assist in magnetic coupling with second component 30. First component 28 may alternatively, or additionally, be retained between two or more components, such as second component 30 and third component 32, as shown in Fig. 2.

[0025] The axle may also include ribs and/or crimped regions to maintain wheels 24  
10 positioned at their respective ends of axle 22. In some embodiments, these ribs and/or crimped regions may be on either side of wheels 24. Wheels 24 may be affixed to a rotatable axle and may be formed from any cost effective and/or light-weight material as desired, such as plastic. In other embodiments both axles 22 and/or wheels 24 may be rotatable. For example, axle 22 may rotate while wheels 24 are in a fixed position  
15 relative to axle 22, or axle 22 may be in a fixed position relative to the rest of toy 10 while wheels 24 are free to rotate about axle 22.

[0026] Further details of how components 12 may couple together are shown in the illustrative examples of Figs. 3-10, which show toy 10 in the form of a vehicle. For example, as shown in Figs. 3 and 4, cockpit 18 may include at least one support 36 that  
20 supports axle 22. Magnetic portion 14 is positioned between supports 36 to provide

coupling between axle 22 and cockpit 18. The supports shown are in the form of plates 38 that each include a groove 40. Axle 22 is able to rotate within groove 40, but axle 22 may be otherwise restricted from moving relative to the rest of the vehicle. Although grooves 40 are shown shaped to correspond to the radius of axle 22, other configurations also are suitable, as grooves 40 need not be arcuate to allow free rotation of axles 22.

[0027] In some embodiments, magnetic portion 14 is mounted upon, or embedded within, a pedestal 42 to maintain magnetic portion 14 in close proximity with axle 22. Thus, supports 36 and pedestal 42 provide appropriate spacing between axle 22 and the remainder of cockpit 18 so that movement of wheels 24 is not restricted and the relationship between the various components more accurately reflects that of a full-sized vehicle.

[0028] As shown in Fig. 3, chassis 18 includes a pair of recesses 44 that mate with support plates 38 so that axle 22 is retained within groove 40 of plates 38, thereby preventing axle 22 from sliding laterally out of grooves 40. Chassis 18 may also conceal these mating portions to provide a more realistic look and feel to the assembled vehicle.

[0029] In some embodiments, such as the one shown in Figs. 4-6, an alignment assembly 46 further assists the child with placement of the components during assembly of the vehicle. When two components are held in close proximity, the magnetic attraction between components 12 pulls them together while alignment assembly 46 guides components 12 to a predetermined configuration so that the child may be

repeatedly successful in assembling the vehicle. The illustrative alignment assembly includes at least one aperture 48 shown in Fig. 4, and at least one post 50, shown in Fig. 5. Aperture 48 and post 50 are sized and shaped substantially the same so that aperture 48 fits into post 50. Apertures 48 are shown mated with posts 50 on the underside of body 16, in Fig. 6. The use of an alignment assembly also may improve the strength of the connection between the components during play.

[0030] Figs. 6-9 show toy 10 in sequential steps of assembly. For example, axels 22 and wheels 24 are added, as are various examples of accessories 26. Accessories 26 may be included to increase play options and the complexity of toy 10 and may represent components that typically are associated with the type of the toy. For example, the accessories may be components that are commonly attached to, or part of, a vehicle, such as a muffler or tailpipe 52; a pair of sideguards 54; and a grill liner 56. As shown in Fig. 10, grill liner 56 may include a grill 58 and headlights 60. Also shown in Fig. 10 is a spoiler 62.

15 [0031] In some embodiments, accessories 26 take the form of items that are not typically part of the toy itself, but are otherwise associated with toy 10. In the example of a vehicle, such accessories may include passengers, pets, sporting equipment, etc. The toy may form interior compartments, or other appropriate regions or surfaces, to accommodate these accessories.



[0032] While referring to Fig. 10, it should be noted that the magnets may take multiple forms. One form is a rectangular flat magnet, as shown schematically at 14. However, for most applications a disc-shaped magnet has been found to work very well, as shown at 114. (Similar disc-shaped magnets are shown in Figs. 4 and 6-8, as item 14.)

5 For yet other connections between components, a rod-shaped magnet 214 works very well. Rod-shaped magnet 214 may be used to attach spoiler 62 to body 16, preferably by forming conformal receptacles 64 within body 16, as shown in detail in Fig. 11.

[0033] Exemplary assembly of toy 10, including its accessories 26, is described below and illustrated in Figs. 4-10. Components 12 may be placed upside down for ease  
10 of assembly, although selection of such an orientation is dependant upon the individual user and the particular configuration of toy 10. Cockpit 18 may be placed within vehicle body 16 so that posts 50 and apertures 48 of alignment assembly 46 engage with one another, and cockpit 18 and vehicle body 16 are coupled together by magnetic portions  
14. Wheel axles 22 may then be placed over the exposed magnetic portions of cockpit 18  
15 so that axles 22 align with grooves 40 formed in supporting plates 38 of cockpit 18. If provided, grill liner 56 may then be coupled to vehicle body 16 in its appropriate position. Once axles 22 have been properly aligned, chassis 20 is placed adjacent cockpit 18 to complete the underbody of the vehicle and secure axles 22, and possibly grill liner 56, within assembled toy 10. Any remaining accessories may then be selectively  
20 attached, such as muffler 52, sideguards 54, and spoiler 62.

**[0034]** It is believed that the disclosure set forth above encompasses multiple distinct inventions with independent utility. While each of these inventions has been disclosed in its preferred form, the specific embodiments thereof as disclosed and illustrated herein are not to be considered in a limiting sense as numerous variations are possible. The subject matter of the inventions includes all novel and non-obvious combinations and subcombinations of the various elements, features, functions and/or properties disclosed herein. Similarly, where any claim recites “a” or “a first” element or the equivalent thereof, such claim should be understood to include incorporation of one or more such elements, neither requiring nor excluding two or more such elements.

**[0035]** Inventions embodied in various combinations and subcombinations of features, functions, elements, and/or properties may be claimed through presentation of new claims in a related application. Such new claims, whether they are directed to a different invention or directed to the same invention, whether different, broader, narrower or equal in scope to the original claims, are also regarded as included within the subject matter of the inventions of the present disclosure.